The Winter Procedure as Management for Prolonged Low-flow Priapism: A Case Report

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Priapism is a prolonged penile erection that is not associated with sexual stimulation. Although the time course has not been formally defined, it is usually considered to be one that lasts for more than 4–6 hours. Low-flow (ischemic) priapism is usually associated with sickle cell disease, hemoglobinopathies, neoplastic syndrome, anticoagulant therapy, psychotropic medication or idiopathic causes. Here, we report a case of prolonged low-flow priapism lasting for 2 weeks, which was successfully treated with the Winter procedure after several attempts of conservative treatment. Although the potency remains unclear and the patient needs a longer period of follow-up, the case reported here still shows that prolonged low-flow priapism can be successfully treated with the Winter procedure when conservative treatments fail.

Key Words: low-flow (ischemic) priapism, Winter procedure
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Priapism is a clinical disease characterized by a prolonged, painful penile erection without sexual stimulation or desire [1]. Its etiology has been traditionally divided into primary, which is idiopathic, or secondary to some other conditions or diseases process. However, for management purposes, it is classified into high-flow (non-ischemic) and low-flow (ischemic) types, mainly by cavernous blood gas analysis. Low-flow priapism is a urologic emergency that needs immediate diagnosis and treatment. The goal of the management of priapism is the attainment of detumescence and preservation of erectile function. We report here a case of prolonged low-flow priapism that was treated successfully using the Winter procedure. We also briefly review current literature on priapism.

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Case Presentation

A 53-year-old male complained of prolonged erection for 2 weeks. The patient had a history of hypertension and benign prostatic hyperplasia with α-blocker control. He denied taking antipsychotics or antidepressants, and alcohol or cocaine abuse. He also denied a history of intracavernous injection or hematologic and cerebrovascular disease. The persistent penile erection occurred after his wife compressed his penis when she rolled over to answer the phone while he was in his usual state of morning erection. Progressive penile swelling and a severe painful sensation developed the following day. He visited the emergency room of a teaching hospital and low-flow priapism was diagnosed. Intracavernous aspiration was performed and about 50 mL of dark red blood was obtained. The symptoms subsided for a while, but then recurred. Several aspiration attempts failed to achieve detumescence.

The patient visited the urology department of Kaohsiung Medical University Hospital for further

management. A rigid and painful erect penis with soft glans was found during physical examination. Laboratory examinations included complete blood count, psychoactive medication screening and urine toxicology examination, all of which were within normal limits. Penile angiography revealed a focal stain at the right aspect of the penis, with suspected penile trauma, but without definite evidence of direct arteriovenous fistula (Figure 1). Color Doppler ultrasonography of the penis revealed no extravasation of the bilateral cavernous artery. Penile cavernous blood gas analysis revealed pH of 7.105, PO_2 of 15 mmHg and PCO_2 of 74 mmHg, comparable with a pH < 7.25, PO_2 < 30 mmHg and PCO_2 > 60 mmHg.

Figure 1. *Angiography of the penis reveals a focal stain at the right aspect of the penis (arrow). Suspected to be penile trauma-induced, but without definite evidence of direct arteriovenous fistula.*

Low-flow priapism was diagnosed and the Winter procedure was arranged. The procedure was performed via two 19-gauge needles punctured through the glans penis to create a shunt between the glans and the corpora cavernosa (Figure 2). Intracavernous irrigation with diluted epinephrine solution (0.1%) into the corpora cavernosa was performed. Penile swelling subsided progressively after the procedure.

When the patient returned to our department for follow-up after discharge, the penis had returned to nearly normal size without any painful sensation (Figure 3). Unfortunately, erectile dysfunction was noted after discharge. Damage to penile tissue caused by prolonged erection was highly suspected and a low dose of sildenafil (25 mg) was given every other day. Penile erection progressively returned after 2 months.

Discussion

Priapism is a prolonged pathologic penile erection unrelated to sexual stimulation that arises from an imbalance between the arterial blood supply to the penis and venous return. According to Hauri et al, priapism is divided into two types: high-flow (non-ischemic) and low-flow (ischemic) [1]. Priapism has an incidence of 1.5 per 100,000 person-years and can occur in all age groups from the newborn to the elderly; incidence is 2.9 per 100,000 person-years for men aged 40 years and older [2]. Typically, there is a bimodal

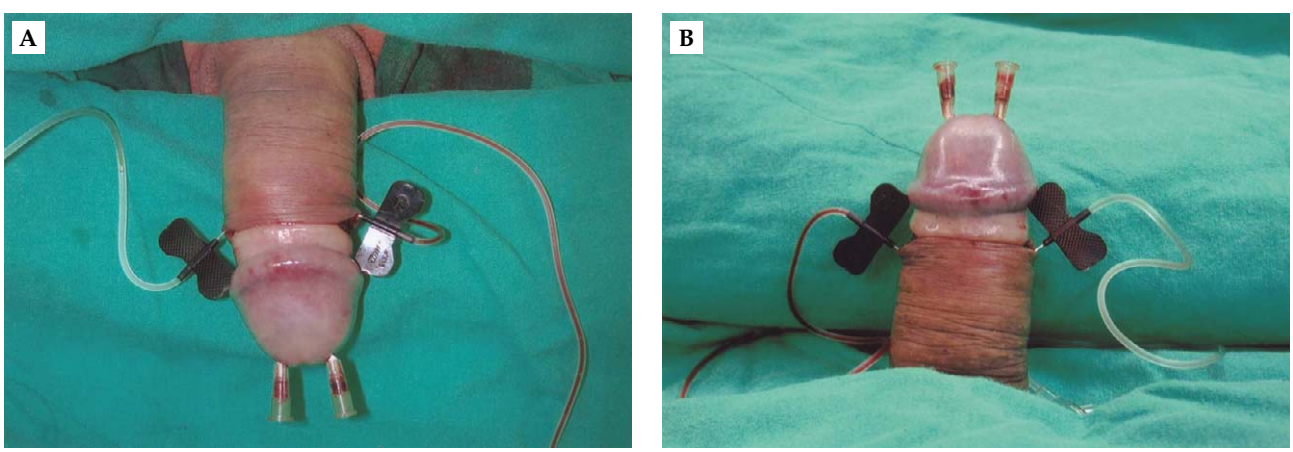

Figure 2. *Two 19-gauge needles were placed through the glans penis to create a shunt between the glans penis and the corpora cavernosa for the Winter procedure, combined with intracavernous irrigation with diluted epinephrine solution (0.1%).*

Figure 3. *Postoperative penile detumescent state.*

peak of incidence between 5 and 10 years in children and 20–50 years in adults. In children, sickle cell disease is the most common etiology, while pharmacologic agents are the most common causes in adults. In one series of 207 patients, Nieminen and Tammala found that 21% of priapism cases were induced by intracavernosal injection of vasoactive drugs [3].

Evaluation of patients with priapism has three components: patient history, physical examination and laboratory/radiologic assessment. To start appropriate management, it must be determined if the priapism is of a low-flow or high-flow type. A detailed history should include the degree of pain, duration of erection, history of pelvic, genital or perineal trauma, medication use (antihypertensives, anticoagulants, antidepressants, alcohol, marijuana, cocaine, vasoactive agents used for intracavernous injection therapy), and sickle cell disease or other hematologic abnormalities.

Physical examination often reveals a flaccid corpus spongiosum and glans penis, but a bilaterally erect corpora cavernosa [4]. Laboratory evaluation should include a complete blood count, reticulocyte count, hemoglobin electrophoresis, psychoactive medication screening and urine toxicology to survey the possibility of sickle cell disease, leukemia and drug abuse. Blood gas analysis of aspirated intracorporeal blood can help to differentiate between high-flow and low-flow priapism [5]. Color Doppler ultrasound and arteriography of penis may also be used as an adjunctive examination to differentiate between the two types of priapism [6–8].

High-flow priapism commonly follows an episode of trauma to the perineum or the genitalia resulting in increased blood flow through the arteries [9]. Low-flow priapism is commonly caused by hematologic disease, mainly sickle cell disease, and less commonly by leukemia in children [10,11]. Black males appear to be more frequently affected than Caucasian males, probably because they have a higher prevalence of sickle cell disease. Drug-induced priapism accounts for about 80% of all adult priapism cases. However, intracavernosal injection with vasoactive substances is becoming the most frequent cause of priapism. Papaverin is associated with the highest incidence of priapism, followed by prostaglandin E1 and moxisylyte [12]. Other causes include malignant penile infiltration and neurogenic problems [13]. Nonetheless, idiopathic causes still represent 30–50% of the disease [14]. Usually, there is an abnormality in the veno-occlusive mechanism, resulting in venous stasis and accumulation of deoxygenated blood within the cavernous tissue. Ischemia and fibrosis of the erectile tissue occur, leading to a risk of erectile dysfunction.

Low-flow priapism is an emergency condition that requires immediate treatment. Primary treatment of this type of priapism should be to correct the underlying disease. A wide variety of treatment options have been proposed for patients with idiopathic priapism, including the use of ice packs, pressure dressings, ice-water enemas, hot-water enemas, prostatic massage, sedatives, analgesics, estrogens, amyl nitrate, systemic anticoagulation, vasodilators and general anesthesia [15–17]. Aspiration with a non-heparinized syringe into the base of one of the corpora cavernosa is the first line of treatment, with a success rate of about 30% [18]. Aspiration can be combined with flushing the corpora cavernosa with normal saline to clear the sludged blood until fresh blood is seen. Instillation of a vasoconstrictive agent such as phenylephrine, repeated at 5-minute intervals until complete detumescence is achieved, is an option that can be performed after aspiration has failed. This procedure has been found to be 100% effective if performed within 12 hours of onset [19].

If medical treatment is unsuccessful in achieving detumescence, surgery is the next step. The goal is to re-establish the flow of blood in and out of the corpora cavernosa by creating a new route for venous return in order to avoid erectile tissue death, fibrosis and erectile dysfunction. Variants of this surgery include creating a fistula between the corpus cavernosum and the glans penis (Winter procedure, Ebbehoj procedure, Al-Ghorab shunt), the corpus spongiosum (Quackles procedure), the deep dorsal vein (Barry procedure)

or the saphenous vein (Grayhack procedure). The Winter procedure can be performed by insertion of a Trucut biopsy needle through the glans into the corpus cavernosum to create fistulae [20]. The success rate for various surgical procedures is around 75% [18]. Several postoperative complications have been reported, including wound infection, bleeding, partial glandular sloughing, urethrocutaneous fistula and herniation of the tunica albuginea.

Erectile dysfunction is the most serious complication of priapism. Kulmala et al reported that impotence correlates with the duration of priapism and patient age [21]. Potency is usually preserved in younger patients in whom priapism was treated within 24 hours, but only 40% of men older than 50 years maintain potency. Another study reported impotence rates of 35–60% when priapism persists for 5–10 days [5].

In this case, low-flow type priapism was diagnosed by blood gas analysis of cavernosal blood and physical examination of the penis. Color Doppler ultrasound and arteriography of the penis also helped rule out high-flow type priapism. In reviewing our patient's history, his episode of priapism might have been caused by injury of his penis by his wife 2 weeks prior. Trauma to the perineum, penis or groin usually results in high-flow type priapism, but can also cause venous compression secondary to penile hematoma or edema, thereby causing low-flow priapism. In this case, we believe that the penile trauma caused by his wife was the major cause of priapism because the laboratory examination and history of this patient ruled out other possible causes of low-flow priapism.

Low-flow priapism is an emergency disease that should be treated within 36 hours to avoid irreversible cavernosal tissue ischemia [22]. In cases of long duration, potency may not be preserved. We report here a case of low-flow priapism of 2 weeks' duration that was successfully treated with the Winter procedure. However, erectile dysfunction ensued because of the severe tissue damage caused by prolonged erection. Surprisingly, low dose sildenafil (25 mg) was helpful in recovering erectile function in this case. Due to the short follow-up period, a longer period is needed to survey the actual potential of sildenafil for the recovery of erectile function.

In conclusion, the Winter procedure is a good alternative treatment for patients with prolonged low-flow priapism who do not respond to conservative treatment.

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以溫氏步驟治療時間過長之低血流性陰莖持久性勃起 — 一病例報告及文獻回顧

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陰莖持久性勃起是指與性刺激無關的陰莖勃起過久的現象，雖然確切的時間未定，但通常是指持續時間超過四至六小時的勃起，低血流 (缺血) 性陰莖持久性勃起通常與鐮刀型血球疾病及其他血紅素病變，惡性腫瘤症候群、抗凝血治療、精神科藥物的使用和不明原因有關。本文報告一位持續兩個禮拜之久的低血流性陰莖持久性勃起患者在接受幾次保守療法失敗之後成功的以溫氏步驟治療其疾病。雖然還需一段較長的時間來追蹤他的勃起功能，本病例仍然告訴我們在時間過長之低血流性陰莖持久性勃起患者在保守療法失敗之後仍可成功的用溫氏步驟來加以治療。

關鍵詞：低血流 (缺血) 性陰莖持久性勃起，溫氏步驟
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